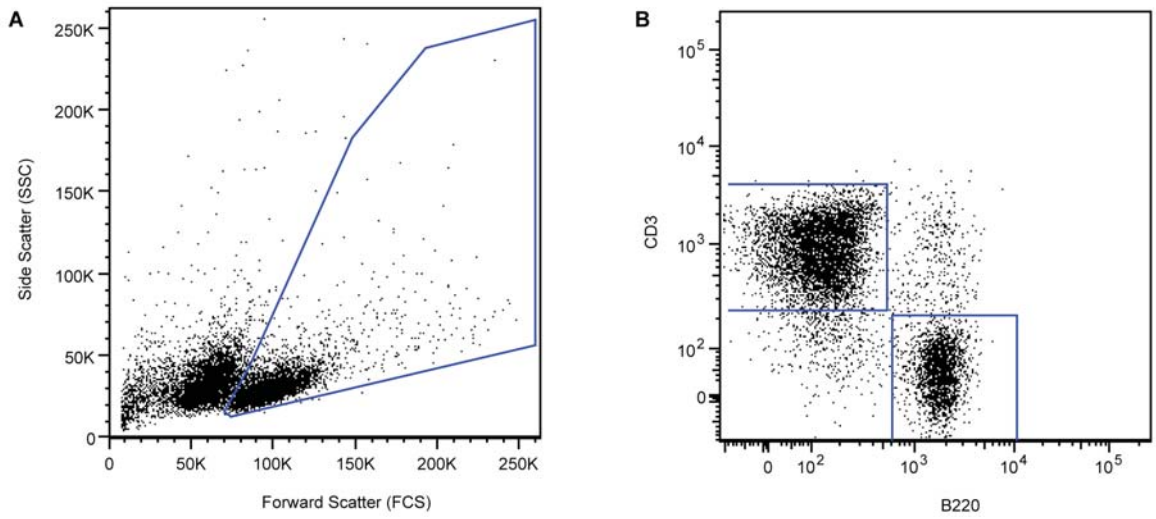
Supporting Information

Cellular Immunostimulation by CpG-Sequence-Coated DNA Origami Structures

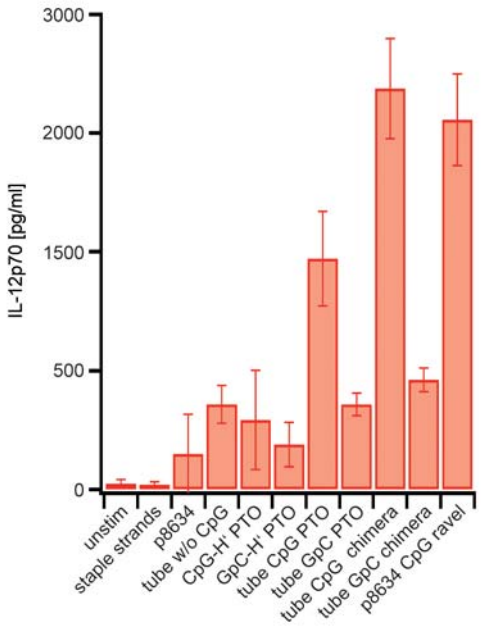
Email: carole.bourquin@unifr.ch.de; tim.liedl@lmu.de

Table of Contents

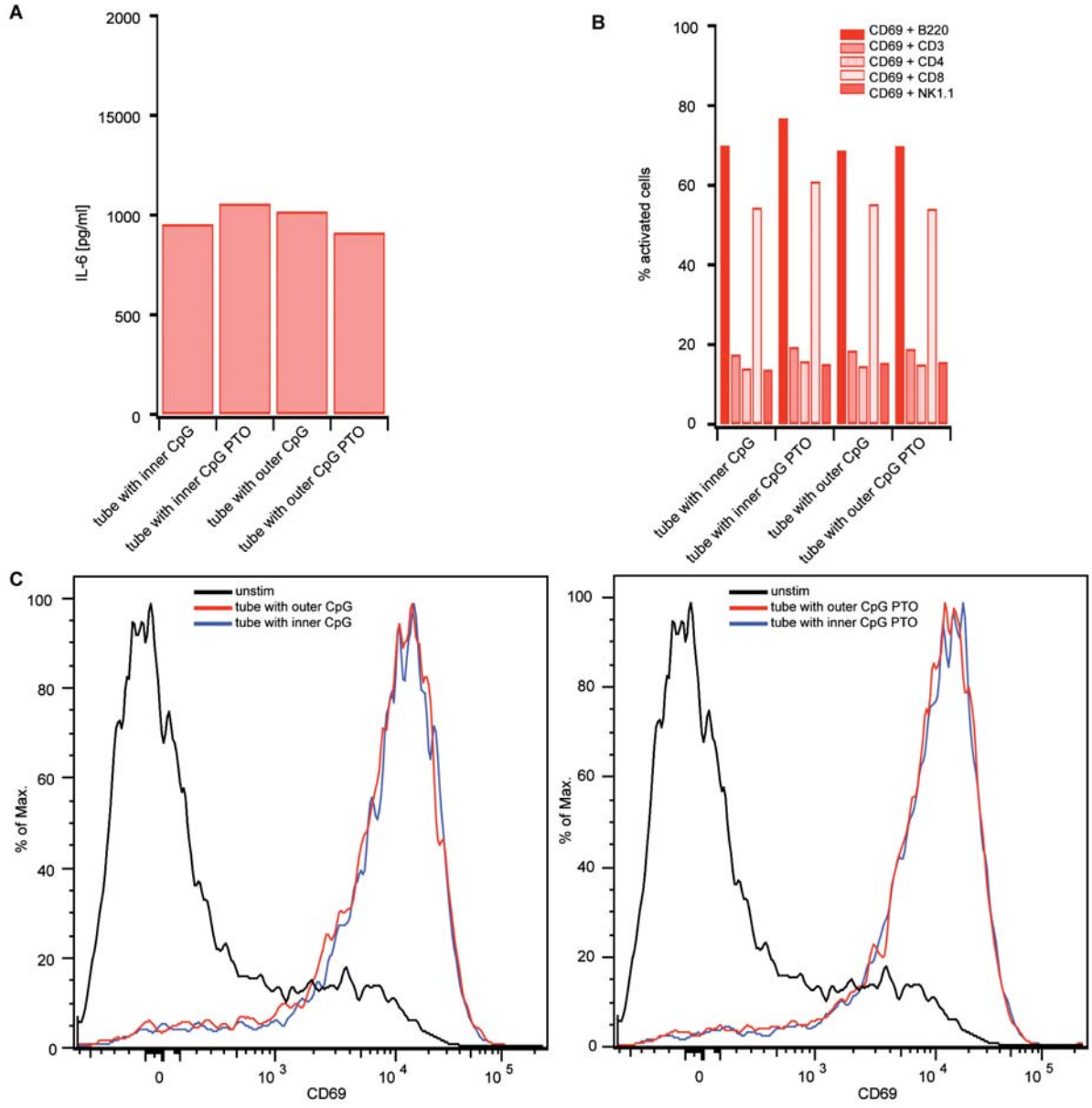
Supporting Figure 1	Representative flow cytometry plots and gates for B-cells and T-cells.
Supporting Figure 2	ELISA analysis of IL-12p70 levels of splenocytes 18 h after transfection with DNA origami tubes.
Supporting Figure 3	ELISA and flow cytometry analysis of immune stimulation caused by CpG-H's on inner versus outer surface of DNA origami tube and representative histograms of CD69.
Supporting Figure 4	ELISA and flow cytometry analysis of IL-6 levels and CD69 expression 18 h after transfection with lipofectamine used as transfection reagent.
Supporting Figure 5	FACS analysis of splenocyte viability after incubation with CpG-H'-decorated DNA origami tubes.
Supporting Figure 6	Gel, TEM and flow cytometry analysis of stability of p8634 CpG ravel and DNA origami tube after pre-incubation in FBS.
Supporting Figure 7	Design schematic of DNA origami tube used in transfection experiments.
Supporting Table 1	Sequences of unextended staple strands of DNA origami tube.
Supporting Table 2	Sequences of staple strands, that are optionally extended by handle sequences for CpG-H's.



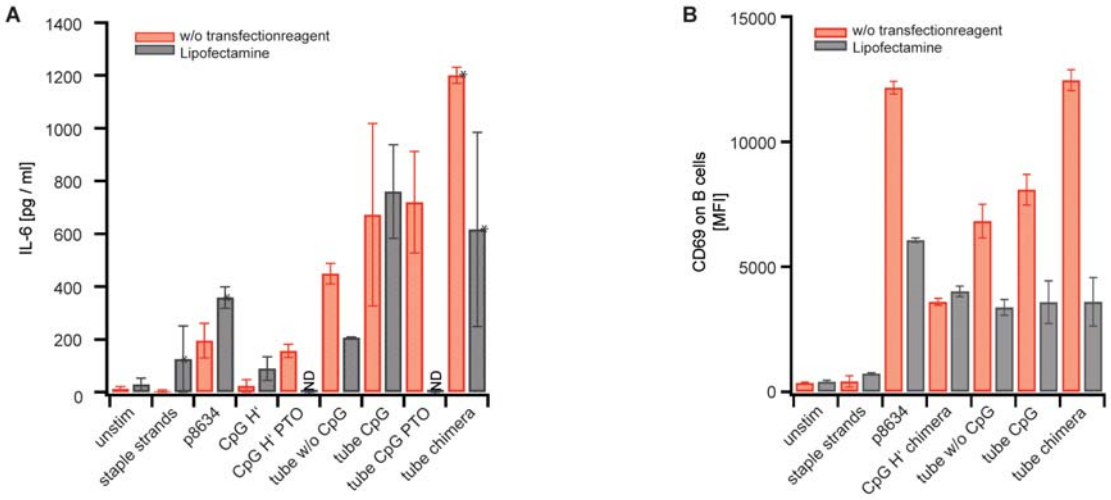
Supporting Figure 1. Representative flow cytometry plots (A) 2D forward versus side scatter dot plot: gates are set for lymphocytes. (B) Two color dot plot of fluorescence intensity of B220+ for B cells versus CD3 for T cells: gate is set for B cells against T cells.



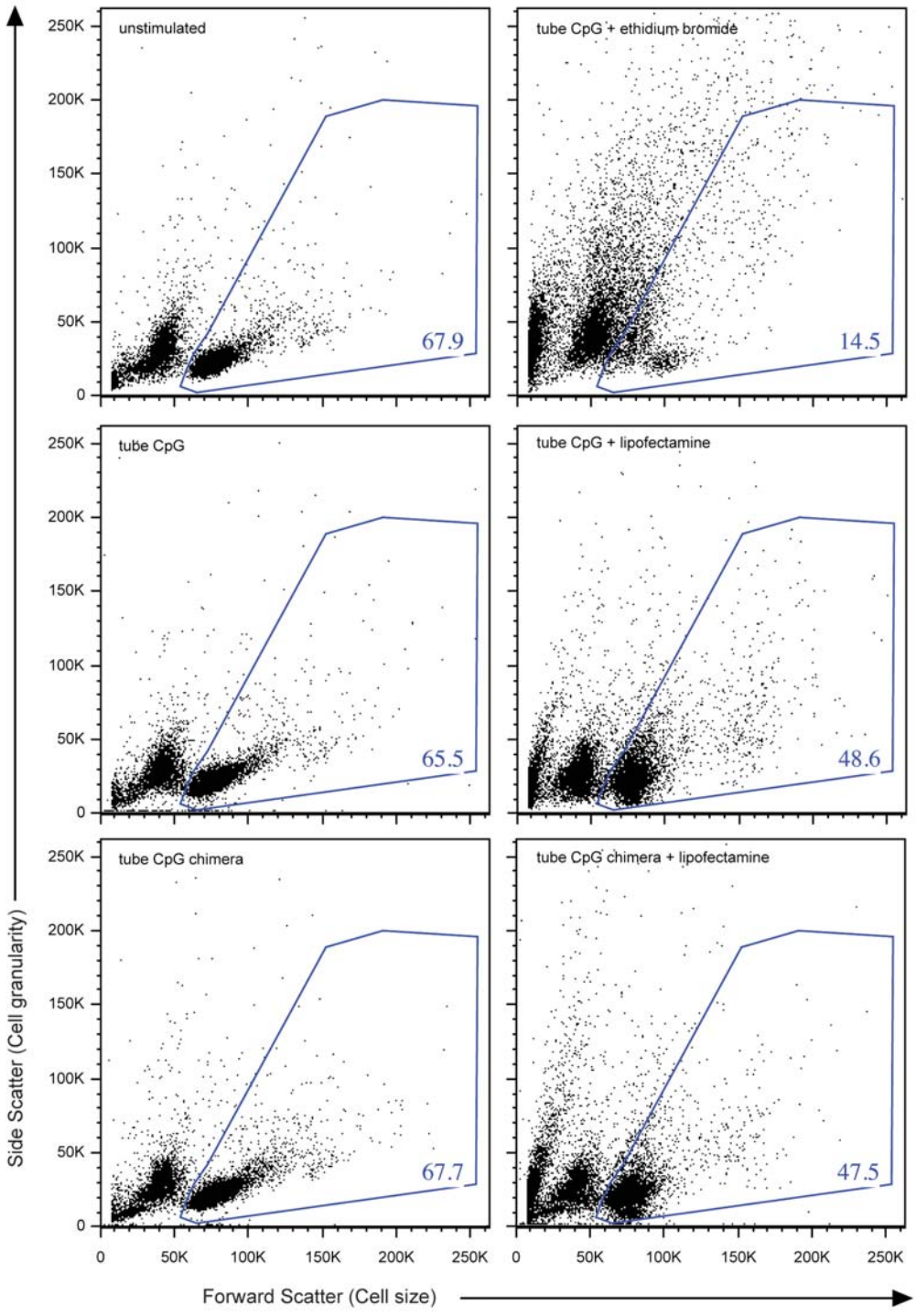
Supporting Figure 2. ELISA analysis of IL-12p70 levels after splenocytes were cultured in the presence of different DNA origami structures for 18 h. 50 μl of 2.4 nM (DNA origami tubes, p8634, staple strands) or 50 μl of 62 x 2.4 nM (CpG-H' PTO, CpG-H' chimera) of sample were added per 400,000 cells in a well. In all experiments, the net CpG weight was 50 ng. Data show the mean value of triplicate samples ± SE and are representative of two independent experiments.



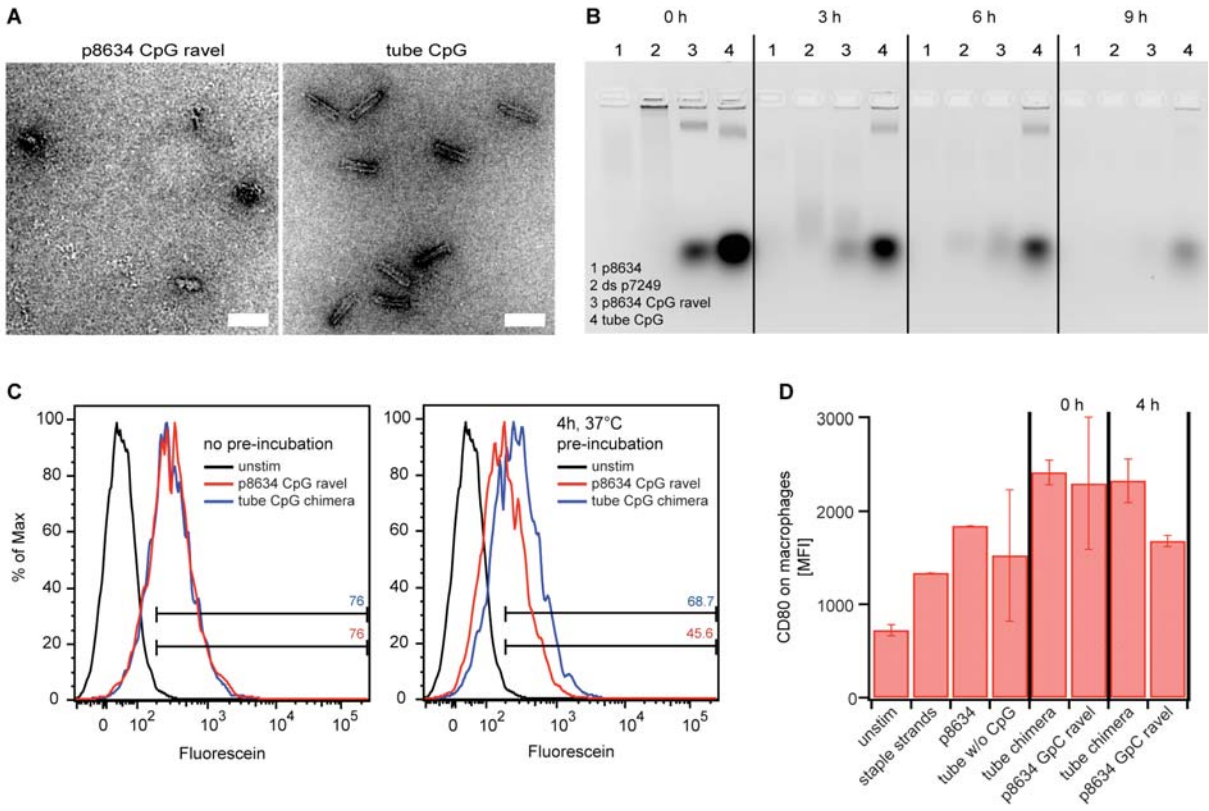
Supporting Figure 3. (A) ELISA and (B) flow cytometry analysis of immune stimulation caused by CpG-H's attached to the inner surface of the tube compared to CpG-H's positioned on the outer surface of the DNA origami tube. (B) Representative histograms show CD69 expression on B cells stimulated with the indicated CpG-decorated oregami tubes.



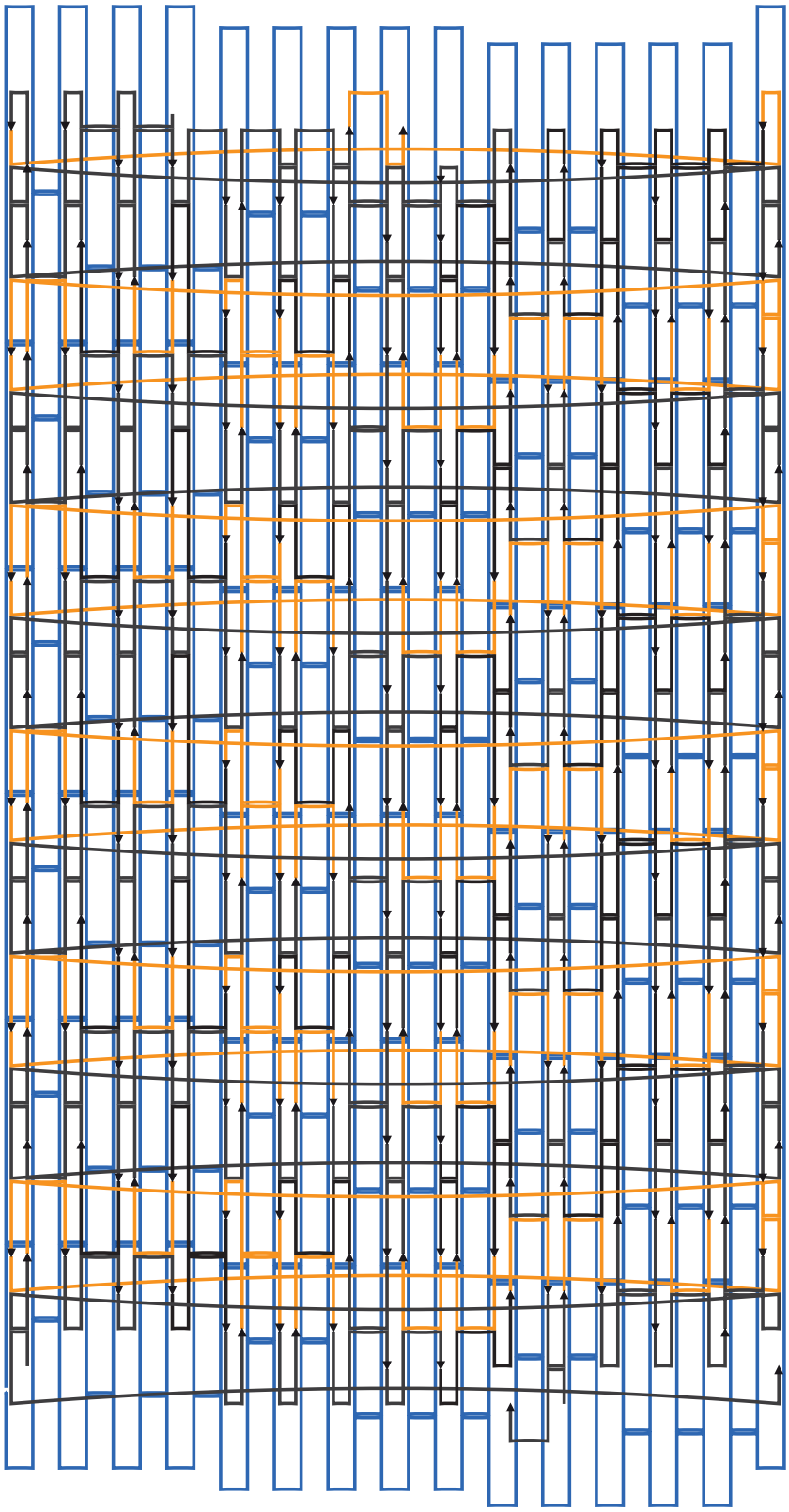
Supporting Figure 4. (A) ELISA analysis of IL-6 levels 18 h after transfection with lipofectamine used as transfection reagent and without transfectionreagent. 50 μl of 2.4 nM (DNA origami tubes, p8634, staple strands) or 50 μl of 62 x 2.4 nM (CpG-H', CpG-H' PTO) of sample and were added to 400,000 cells per well. In all experiments, the net CpG weight was 50 ng. Lipofectamine was applied as suggested by the supplier. Mean values are derived from independent cell experiments on different days. Error bars indicate the absolute minimum and maximum error values. Values denoted with * originate from a single experiment with two replicates. Error bars indicate the absolute minimum and maximum error. (B) Flow cytometry analysis of immune cell activation after incubation with DNA origami tubes. Freshly isolated splenocytes from wild-type and TLR9-deficient mice were incubated with 50 μl of 2.4 nM (DNA origami tubes, p8634, staple strands) or 50 μl of 62 x 2.4 nM (CpG-H' PTO, CpG-H' chimera) for 18 h. Surface expression of the activation marker CD69 was analyzed on B cells.



Supporting Figure 5. FACS analysis of splenocyte viability after incubation with CpG-H' and CpG-H' chimera decorated DNA origami tubes. Freshly isolated splenocytes were incubated without DNA, with 50 μl of 2.4 nM CpG-H' and with CpG-H' chimera-decorated DNA origami tubes for 18 h. In some conditions, lipofectamine or ethidium bromide was added to the culture. Dot blots from a representative experiment show the morphology of unstained splenocytes. The number indicates the frequency of viable cells within in the sample.



Supporting Figure 6. (A) Electron micrographs of p8634 CpG ravel and DNA origami tubes chimera. Scale bars: 100 nm. (B) Gel analysis of p8634, ds7249, p8634 CpG ravel and DNA origami tubes chimera 0h, 3h, 6h and 9h after pre-incubation in serum-containing medium. Without incubation, a prominent band is visible for both DNA ravel and origami structure. After 6 hrs of incubation the band of the ravel disappeared while the preserved band of the DNA origami tube indicates still intact structures. (C) Representative histograms show fluorescence shift indicating decreased uptake of p8634 CpG ravel compared to DNA origami tubes chimera after 4h of pre-incubation in FBS. (D) Flow cytometry analysis of immune cell activation after addition of DNA origami tubes and p8634 CpG ravel 0h and 4h after pre-incubation in FBS. Freshly isolated splenocytes were incubated with 50 μl of 2.4 nM (DNA origami tubes, p8634, staple strands, p8634 CpG ravel) for 18 h. Surface expression of the activation marker CD80 was analyzed on macrophages.



Supporting Figure 7. Design schematic of DNA origami tube used in transfection experiments. blue: scaffold path, black: unextended staple strands, orange: staple strands, optionally extended by handle sequence for CpG-H's.

Supporting Table 1. Sequences of unextended staple strands of DNA origami tube.

Oligo1	AAAAAGATTGGGCTCTGAGTTAGAGTCT
Oligo2	AGGCAAAGCGCCAATGTCTGGTGCCGGA
Oligo3	CCCTGACTATTAAGTGAAAAATCAGGTC
Oligo4	AACAGTTTCAGCGCAGTTGCTAAACAAC
Oligo5	CTGGCATGATTATGATGGAATACCCAAA
Oligo6	CATGCAGTCTCAGGCACGTTATCAATGT
Oligo7	GATCGGTAAATTAAGCATTCGCCATTCA
Oligo8	AGAGGAAGCGAAACAATAGTCAGAAGCA
Oligo9	GAATAATGGAACCAGAGGAGTGAGAATA
Oligo10	AAATACATGTAAATGCAGACTCCTTATT
Oligo11	GACGGCCAGTGCTGCGCACGACGTTGTA
Oligo12	CCTTTTGATAAGGCAGAGTACCTTTAAT
Oligo13	GATACCGATAGTTTCAATTTCTTAAACA
Oligo14	ACAAAAGGGCGAGCAGTTTACCAGCGCC
Oligo15	GCATTCGCATCATAGAATGATGTCTGACGCGAAGA
Oligo16	AATAATTCGCGTACCTTAGGAACGCCATCATAAAA
Oligo17	AGGAATTACGAGAACCGATACATAACGCCAATTAC
Oligo18	CCACCCTCAGAAGGGCAGGAGGTTTAGTACGGAAC
Oligo19	GGGAAGCGCATTTAGTGAATAACATAAAAACGCGA
Oligo20	GCGAAAAGGTCCACGCTGGTTTCCCTTCACCGCCT
Oligo21	CTTGTGCAAGTTTCTCGTTCAGGGTTGTTGAGTGT
Oligo22	GGCATCAATTCTAGGGCGCGAGCTGAAAAAATGGT
Oligo23	AACCTAAAACGAAGTGCCACTACGAAGGTCATGAG
Oligo24	CGTTTTCATCGGTCTAGCGTCAGACTGTAGCACCG
Oligo25	CGTCGCTATTAATGTTTTAATGGAAACAAAATTAA
Oligo26	TCGAAGACGCCTGGCATGAAGGTTTATAGTCGGCA
Oligo27	AAATTTTCATTTGGTTGGGTAACGCCAGTGCTGCA
Oligo28	TGTAAAATACGTAACAAACTCCAACAGGAGCGAAC
Oligo29	GCCAAGTTTGCCTTGGTTTATCAGCTTGGGAGCCT
Oligo30	AATTGAATTACCTTTCACAATCAATAGACGGAATA
Oligo31	GCGTTGCTGTAAAGCCTGGGGCGAGCCGCACGCTCACAATTC
Oligo32	CGCAGACGCGTGAAGCGGCAGAATTAACACACAGAGAGGTTC

Oligo33	ATGACCCTAAAGCCTCAGAGCATTAGCAGCAAATCATACAGG
Oligo34	CGCGACCTACAACGGAGATTTACCAAGCGCCATCTTTGACCC
Oligo35	CACCCTCCACCACCGGAACCGAATCACCAAGTTTGCCATCTT
Oligo36	GTTTGAAATGCAAATCCAATCAACTATATAGAATTTATCAAA
Oligo37	TAGAATCGCTGAGAAGAGTCAATAGTCATTTTAATTTTCCCT
Oligo38	GGCGATCATCTGCCACTCATTACAGCAATAAAAATGAAGAAT
Oligo39	CAATAACCCATTAGATACATTTTGATTCCCAATTCTTTCATT
Oligo40	GAAGTTTTGAGGACTAAAGACCAGCATCGGAACGAACCCTCA
Oligo41	TAATCAGAATGAAACCATCGAGTAGCACCATTACCGAGCCAG
Oligo42	TTACATTGAATTATTCATTTCATTGCTTTGAATACCAGATGA
Oligo43	TTTCGCGTGATAACGCTTGTGAAAGCGTGAGTATTATTGCTAAACTGCG
Oligo44	ACCCGTCTCACATTAAATGTGAGTAGCTGATAAATTCTACAAAGGCTGC
Oligo45	AACCAAAGTCTCGTTTACCAGACTCAACGTAACAAACGAGAAACACCAC
Oligo46	ATAGCAATGAGCCACCACCCTCAGCGTCATACATGAGTTTTAACGGGAC
Oligo47	GCTAATAAGACAAAGTCAGAGGGTCCCATCCTAATACCGCACTCATCAC
Oligo48	AACGACATACATGACTGATACCGTTTAGGTTGAGTATTATCTACCGTAC
Oligo49	CTCAGGAAGATCCCGACGACGACAGTATATGGGCGCATCGTATAGGTCA
Oligo50	ATGCTTTAAACATGTCATTGAATCCCCCCTGGATAGCGTCCAAATAGTA
Oligo51	TCTTTCCAGACGACCGATCTAAAGTTTTCTGTAGCATTCCACCAGTACA
Oligo52	CAAAGTTACCAGTTAGTAAGCAGATAGCATAGCAATAGCTATAGAGCAA
Oligo53	GTAAAACGTAACAGTCGCCTGAATTACCGAAAACAGTACATATGTAAAT
Oligo54	TTATCCGGCCGTTTTTATTTTGTATTAA
Oligo55	ATTGTCGTGCCAGCGGCGGTTTGCGTGA
Oligo56	GCGTGCTGGAACTGCAAACGCCGCGAGC
Oligo57	AGTCAACGCAAGGATGCAATGCCTGAAA
Oligo58	TTCAGACGGTCAATAGGACAGATGAACG
Oligo59	GAACCACCACCAGAGGTCAGACGATTAA
Oligo60	TACAAATCGACCGTGTGATAATTTAATG
Oligo61	AGTTTATTAAAGGTGGCAACAACGTAGA
Oligo62	CAATGTGCGAGAGATTACAAATCCCCAT
Oligo63	CGGCATCGTACAGATATACTTGCGGCTATTT
Oligo64	ATCATAGAGGTTGGGTTATATGCAAGACACC
Oligo65	TAAAATAAGGCTATCATAAACGCTCTTAGGCA
Oligo66	CCACTATTAAAGACCCAGTTTGGAACAAAATCAAA

Oligo67	TGACCTGGAAGAGGTATCAAGCACTGCACAGTTTC
Oligo68	GGTTGATAATCATTGTCAATCATATGTAACAAGAG
Oligo69	ATTATACCAGTCTTGATTTTAAGAACTGTTTAATT
Oligo70	TAAGAGGCTGAGAGTCTGAAACATGAAAAACAGTT
Oligo71	TGCACCCAGCTAAATAGCGAACCTCCCGAGAAGGC
Oligo72	TAAGCGTACGAAGGTGTTATCGGCAGCAAAATCAA
Oligo73	TGAGAGATAATGCCGGAGAGGATCATCAATATGAT
Oligo74	TGCCCTGAGCTGCTCATTCAGGCAGAACCGGATAT
Oligo75	GGTAATAGCTTTTGATGATACTCTCTCTGAATTTA
Oligo76	ACCAAGTTTACGAGCATGTAGATAAGTCCTGAACA
Oligo77	GGTAAGAATACGTGAACGCGCGGGGAGATGCATTA
Oligo78	GGACATAAACATTGAACCAGCAATACATCTGGATG
Oligo79	TACCAGTTTGAGGGTCATATATTTTAAATAAAAAT
Oligo80	CACGTCATAAATATACCAACTTTGAAAGCATAAGG
Oligo81	CATAGTTAGCGTAAAGGAGGTTGAGGCAGCCGCCG
Oligo82	GACTTTTTAAGAAAACCAGTATAAAGCCTGCGTTA
Oligo83	TAATCATGGTCAACGTACCGAGCTCGAATAAATGC
Oligo84	ATATACAAGAAATATTGGATTAAATAAACACAATT
Oligo85	CAATAAACAACATGATTCTGTGAGCCAGATGTAATAACAGTA
Oligo86	ACAGCCCAATAATACTTACCGAAGCCGGCATTTTCCCAGACG
Oligo87	ACTTCCGTTTGTTTTATGGAGCGCGGGGATTTATTCATAACA
Oligo88	ATCCTCGCTCTGTACAATAGAGCGAAAAAAAAACGTGGACTCC
Oligo89	TACAGCGGAAAGATCAAACAAAAGACCCTGGTTTCTGCGGCA
Oligo90	CCATATAATGTTTTTATTAATTTGTATATTGAAAAGCCCCAA
Oligo91	GCAGCGAGCTTGCACAAAGAACGTTAATGAAGGACGTTGGGA
Oligo92	CAAAATCAATTATCGATTATCTTAGCGGATACTCCTCAAGAG
Oligo93	AGAACTCACCGTCTATCATTTTAGATTA
Oligo94	AGGTCAAGTTAGTAACTATCGAGTATTA
Oligo95	ATTAAATAGCAAATATTTAAACTTTGCC
Oligo96	CAGTTGAAAAACGAACTAACGATCATTT
Oligo97	TATAAGTGGTTTTGCTCAGTAATCATCA
Oligo98	TTAACGTCAGCCATATTATTTATAATCC
Oligo99	CTCCTGTTTCAGGATGCAGGTGGGTTGG
Oligo100	CTAGCATGTTAAATCAGCTCAAATTCGC

Oligo101	CTTATGCTAGGAATACCACATGATTCAT
Oligo102	CTATTATCCCGGAATAGGTGTGGGTTGA
Oligo103	GGCGTTTAATGAAAATAGCAGTTTTTGT
Oligo104	AGAATAGTCGGCAAAATCCCTCCAGCAG
Oligo105	TTGTTGTGTCCGTGAAGACGGATGGGAG
Oligo106	AATCGATCCTGAGAGTCTGGACTATTTT
Oligo107	TCAACTTAAATTGGGCTTGAGTAAGGCT
Oligo108	AATGCCCAGTAACAGTGCCCGGTGTACT
Oligo109	ATGAAAGCAACGAATCGCCATCCTGGTG
Oligo110	TAATCAGGTCATTGGAACGGTAATCGAA
Oligo111	CAAGAACGAGTAGTTAATCATTGTGAAA
Oligo112	GAGTCAGTGCCTTGCCTGCCTATTTCCG
Oligo113	TAGAGAACAAGCAAGTATTCTAAGAACA
Oligo114	GGCCCTGAGAGATCAGTCACACGACCCA
Oligo115	AACTCAACGAGCAACAGAGTCTGTAGTG
Oligo116	ATTCAACCGTTCCGAACGGCGGATTGGA
Oligo117	TCATTACCCAAAGAAAAAGAAGTTTTGA
Oligo118	CCGTTCCAGTAATTTACCGTAACACTAA
Oligo119	AGAAAAATAATATAAGAATTGAGTTAGA
Oligo120	GGAGTAATAAAAGGGACCTGAAAGCGTG
Oligo121	CGTGTCAGATGATGTACTGTTTCTTTAT
Oligo122	GAACCGTAATGGGAACCGTGCATCTGAA
Oligo123	AAGCCAGAGGGGGTATACTGCGGAATGG
Oligo124	AGGAGTTTCGTCACAGACAGCCCTCACA
Oligo125	ATGAATCACTGCCCGCTTTCCATTAATT
Oligo126	AACGGGATCCATGAATTGGTAGATTTGA
Oligo127	TTTTAGAATACTTTTGCGGGAAAACATT
Oligo128	GAACCGACCATGTTACTTAGCCGAAATC
Oligo129	CCAGCATCCACCACCCTCAGAGAACCGC
Oligo130	ATGAGTATCAATTTAATGCAAGGAGTTT
Oligo131	TCCGGCACCGCTTAACGCACTCCAGCCA
Oligo132	TGACCATAAATCCTACGTTCAGAAAACG
Oligo133	CTGTATGGGATTAGTGTTAGTAAATGAA
Oligo134	CGCAATAATAACACTCAAGGAAACCGAG

Oligo135	GAAATTGTTATCCCTCTAGCTGTTTCCT
Oligo136	ACTTATCAGTAAATATGCCAGGAGGATC
Oligo137	TTAACATCCAATGGTAACTAATAGTAGT
Oligo138	CACTAAAACACTCCGAAAGAGGCAAAAG
Oligo139	CCCCTTATTAGCTTTACATTTTCGGTCA
Oligo140	TAAAGCAGCCTGCAACAGTGCGCGGTCA
Oligo141	TACAAATCACGAAGGTGTTTATTGTCTC
Oligo142	AGGCGATGCCTCTTCGCTATTGAAGGGC
Oligo143	CAGACCGGAAAGACTTCAAATAAGATTA
Oligo144	TTAATTGTTTTCACGTTGAAAGAATTGC
Oligo145	CGCCACCAGGCTATCGATAGATGAACTG
Oligo146	TTGATTTAGTTTGACTGTTTAGCTATAC
Oligo147	CGCTACAGAGGCTTCCATTAAACGGGCT
Oligo148	GAGGAAACGTCACCTAGCGACAGAATTT
Oligo149	TGTCGCGCAGAGGCTAACAATTTCATAG
Oligo150	GGGCATCAGAAATAGCGCCGCCTGAATG
Oligo151	AAGGTGTCTGGAAGTGCGAACGAGTACG
Oligo152	ATTGCGGGATCGTCGGGTAGCAACGGGA
Oligo153	ATATTTGGGAATTAATTAGCAAGGCCCA
Oligo154	AACAGGTTTAACGTCAAGTTACAAAAAG
Oligo155	TTATCCTGAATCTTATTTGCC
Oligo156	TTGCCCTCACACGAGTACGGT
Oligo157	GATTAATCATGCGTATTAACC
Oligo158	GCTCAACACTAATTGCTGAAT
Oligo159	CGCTGAGAACACGCATAACCG
Oligo160	AAAGGTGACAATATTGACGGA
Oligo161	GACTTTAGGCAGACATCATTG
Oligo162	CGAACGTAAATATGCAACTAA
Oligo163	TGCGGAAGGGAGTTAAAGGCC
Oligo164	TATTCCTACCGTCACCGACTT
Oligo165	TGATTGTAAGAAATTGCGTAG

Supporting Table 2. Sequences of staple strands, that are optionally extended by handle sequences for CpG-H's.: (A) staple sequences without handles for undecorated DNA origami tubes. (B) staple sequences with handles for DpG-H's.

(A)

Oligo166	TCAAAGGTAATACATTTGAGGACGATAC
Oligo167	ATCGAACTTCGACAACTCGTAGTTCAGG
Oligo168	AGGAAGATTTAAAAGTTTGAGTGCTGTA
Oligo169	AAATCTAACCACCAGAAGGAGATTCGGT
Oligo170	ATTAGGAAGATGATGGCAATTATTCATT
Oligo171	AGTTACAATACTTCTGAATAATTTGCAC
Oligo172	AAATCGCTATTACGGAGTATCTGCATGT
Oligo173	GTATATTTTGTTAATTTTTTAACCAAGG
Oligo174	AATACAGGTAGAAATCAACTAATGCACC
Oligo175	AGGTGCCGTCGAGAATCACCGTACTCTC
Oligo176	AAATAAGAAACGATCCTTTACAGAGAAT
Oligo177	GTTTTGTAAAAGCCTAAAGGAGAGTGAG
Oligo178	CAGCTTTCATCAGGAACTGGCCTTCCTG
Oligo179	ACTATCATAACCAGGCGCATAGTAAGAG
Oligo180	CGCCACCCTCAGAAATCCGCCACCCTCA
Oligo181	TGAACACCCTGAGATAAGACGGGAGAAT
Oligo182	ACAGCTGATTGCGTTCACCAGTGAGACG
Oligo183	TTGAGCTTGAAAATGTGTAGGGAAACTG
Oligo184	CAGTCAAATCACAGTATGAGAAAGGCCG
Oligo185	GTAATCTTGACACCACCTGACCTTCATC
Oligo186	TGGAAAGCGCAGAGTGCTCATTAAAGCC
Oligo187	TCAAACACTTCACAGCGATGCTGCTGAA
Oligo188	CGTTGGTTCTCCGTGGGAACAAGTAACA
Oligo189	AAATGTTCGAGAGGCTTTTGCCGATAAA
Oligo190	AACTACAAATAGGAACCCATGTTCAGGG
Oligo191	GAAACAAAGAGATAACCCACAATTGAGC
Oligo192	GTTTTTCTTTTCGGCTATTGGGCGCCAG
Oligo193	ATTGCGCTAACAAGCGCCAGGAGAACGA
Oligo194	GATTCAAAAGGGGATCGTAATGTGTAGG

Oligo195	CGCATAGGCTGGGCGTCGGTGTACAGAC
Oligo196	AACAAATAAATCAACGGGCCTTGATATT
Oligo197	GGGCTTAAAAAGCCTGTTTAGGTTAAAT
Oligo198	GAGAGCTAACTCACAGTCGGGAAACCAA
Oligo199	AAATGACGACTGGGACACCATCGATTTT
Oligo200	TTCGGTTGTACCAAGAAGCCTTTATTAA
Oligo201	TTGATAAATTGTGTCGGAACGAGGCGTT
Oligo202	AGCCGCCACCCTCAGCCGCCACCAGAAA
Oligo203	TGTGCCACAACATATGCCTAATGAGTGC
Oligo204	GGCTGAGTGAGCGAAGCAGGCAATGCCC
Oligo205	AAGCGAGGCAAAGAATAAAGCTAAATTA
Oligo206	GAAAGAGCGATTATGTATCATCGCCTTC
Oligo207	ACGCACATAATCAACCTCCCTCAGAGAA
Oligo208	CAAGATCCGGTGTCTGTAGATGAAGGGT
Oligo209	GACGCAACTGTTGGACGCCAGCTGGCGA
Oligo210	CAGATTGCATCAAAATCGCGTTTTAACA
Oligo211	CCGAACAACTAAAGATCTCCAAAAAATA
Oligo212	TTGTATGTTAGCAATATAAAAGAAACGC
Oligo213	GTTATAGATATAGAAGTCTAATGAAGCG
Oligo214	TGGAAAGGGGGATGGGTTTTCCCAGTGA
Oligo215	AGTTCGAGCTTCAATCAGGATTAGAGGT
Oligo216	AAAAGGCTCCAAAACTTTCGAGGTGACC
Oligo217	TAGCAAAGACACCAAAATTCATATGGCG
Oligo218	CAAAATTATTATCTATAATGACTGATAC
Oligo219	CATTCACCCTCAACGTCAAGCTTTATTA
Oligo220	TGGCTTAGAGCTAGTCAGGTCATTTTTG
Oligo221	ACAACCATCGCCGATTTGCGCCGACAAT
Oligo222	GGAGGGAAGGTACATACATTCAACCGAT
Oligo223	ATTCAAAATTTAGAACATCATTACGCCG
Oligo224	AGTACCATTAAATCTTGTAAACGTTATA
Oligo225	GCTTTAATAACATTGAACAACATTATAC
Oligo226	GAGCCATCGGAATTCCAGGCGGATAAAA
Oligo227	ATTTTTTCATCAATATCCCAATCCAAGG

(B)

Oligo228	TCAAAGGTAATACATTTGAGGACGATACTCTCTTCACCGTAATCTT
Oligo229	ATCGAACTTCGACAACTCGTAGTTCAGGTCTCTTCACCGTAATCTT
Oligo230	AGGAAGATTTAAAAGTTTGAGTGCTGTATCTCTTCACCGTAATCTT
Oligo231	AAATCTAACCACCAGAAGGAGATTCGGTTCTCTTCACCGTAATCTT
Oligo232	ATTAGGAAGATGATGGCAATTATTCATTTCTCTTCACCGTAATCTT
Oligo233	AGTTACAATACTTCTGAATAATTTGCACTCTCTTCACCGTAATCTT
Oligo234	AAATCGCTATTACGGAGTATCTGCATGTTCTCTTCACCGTAATCTT
Oligo235	GTATATTTTGTTAATTTTTTAACCAAGGTCTCTTCACCGTAATCTT
Oligo236	AATACAGGTAGAAATCAACTAATGCACCTCTCTTCACCGTAATCTT
Oligo237	AGGTGCCGTCGAGAATCACCGTACTCTCTCTCTTCACCGTAATCTT
Oligo238	AAATAAGAAACGATCCTTTACAGAGAATTCTCTTCACCGTAATCTT
Oligo239	GTTTTGTAAAAGCCTAAAGGAGAGTGAGTCTCTTCACCGTAATCTT
Oligo240	CAGCTTTCATCAGGAACTGGCCTTCCTGTCTCTTCACCGTAATCTT
Oligo241	ACTATCATAACCAGGCGCATAGTAAGAGTCTCTTCACCGTAATCTT
Oligo242	CGCCACCCTCAGAAATCCGCCACCCTCATCTCTTCACCGTAATCTT
Oligo243	TGAACACCCTGAGATAAGACGGGAGAATTCTCTTCACCGTAATCTT
Oligo244	ACAGCTGATTGCGTTCACCAGTGAGACGTCTCTTCACCGTAATCTT
Oligo245	TTGAGCTTGAAAATGTGTAGGGAAACTGTCTCTTCACCGTAATCTT
Oligo246	CAGTCAAATCACAGTATGAGAAAGGCCGTCTCTTCACCGTAATCTT
Oligo247	GTAATCTTGACACCACCTGACCTTCATCTCTCTTCACCGTAATCTT
Oligo248	TGGAAAGCGCAGAGTGCTCATTAAAGCCTCTCTTCACCGTAATCTT
Oligo249	TCAAACACTTCACAGCGATGCTGCTGAATCTCTTCACCGTAATCTT
Oligo250	CGTTGGTTCTCCGTGGGAACAAGTAACATCTCTTCACCGTAATCTT
Oligo251	AAATGTTCGAGAGGCTTTTGCCGATAAATCTCTTCACCGTAATCTT
Oligo252	AACTACAAATAGGAACCCATGTTCAGGGTCTCTTCACCGTAATCTT
Oligo253	GAAACAAAGAGATAACCCACAATTGAGCTCTCTTCACCGTAATCTT
Oligo254	GTTTTTCTTTTCGGCTATTGGGCGCCAGTCTCTTCACCGTAATCTT
Oligo255	ATTGCGCTAACAAGCGCCAGGAGAACGATCTCTTCACCGTAATCTT
Oligo256	GATTCAAAAGGGGATCGTAATGTGTAGGTCTCTTCACCGTAATCTT
Oligo257	CGCATAGGCTGGGCGTCGGTGTACAGACTCTCTTCACCGTAATCTT
Oligo258	AACAAATAAATCAACGGGCCTTGATATTTCTCTTCACCGTAATCTT

Oligo259	GGGCTTAAAAAGCCTGTTTAGGTTAAATTCTCTTCACCGTAATCTT
Oligo260	GAGAGCTAACTCACAGTCGGGAAACCAATCTCTTCACCGTAATCTT
Oligo261	AAATGACGACTGGGACACCATCGATTTTTCTCTTCACCGTAATCTT
Oligo262	TTCGGTTGTACCAAGAAGCCTTTATTAATCTCTTCACCGTAATCTT
Oligo263	TTGATAAATTGTGTCGGAACGAGGCGTTTCTCTTCACCGTAATCTT
Oligo264	AGCCGCCACCCTCAGCCGCCACCAGAAATCTCTTCACCGTAATCTT
Oligo265	TGTGCCACAACATATGCCTAATGAGTGCTCTCTTCACCGTAATCTT
Oligo266	GGCTGAGTGAGCGAAGCAGGCAATGCCCTCTCTTCACCGTAATCTT
Oligo267	AAGCGAGGCAAAGAATAAAGCTAAATTATCTCTTCACCGTAATCTT
Oligo268	GAAAGAGCGATTATGTATCATCGCCTTCTCTCTTCACCGTAATCTT
Oligo269	ACGCACATAATCAACCTCCCTCAGAGAATCTCTTCACCGTAATCTT
Oligo270	CAAGATCCGGTGTCTGTAGATGAAGGGTTCTCTTCACCGTAATCTT
Oligo271	GACGCAACTGTTGGACGCCAGCTGGCGATCTCTTCACCGTAATCTT
Oligo272	CAGATTGCATCAAAATCGCGTTTTAACATCTCTTCACCGTAATCTT
Oligo273	CCGAACAACTAAAGATCTCCAAAAAATATCTCTTCACCGTAATCTT
Oligo274	TTGTATGTTAGCAATATAAAAGAAACGCTCTCTTCACCGTAATCTT
Oligo275	GTTATAGATATAGAAGTCTAATGAAGCGTCTCTTCACCGTAATCTT
Oligo276	TGGAAAGGGGGATGGGTTTTCCCAGTGATCTCTTCACCGTAATCTT
Oligo277	AGTTCGAGCTTCAATCAGGATTAGAGGTTCTCTTCACCGTAATCTT
Oligo278	AAAAGGCTCCAAAACTTTCGAGGTGACCTCTCTTCACCGTAATCTT
Oligo279	TAGCAAAGACACCAAAATTCATATGGCGTCTCTTCACCGTAATCTT
Oligo280	CAAAATTATTATCTATAATGACTGATACTCTCTTCACCGTAATCTT
Oligo281	CATTCACCCTCAACGTCAAGCTTTATTATCTCTTCACCGTAATCTT
Oligo282	TGGCTTAGAGCTAGTCAGGTCATTTTTGTCTCTTCACCGTAATCTT
Oligo283	ACAACCATCGCCGATTTGCGCCGACAATTCTCTTCACCGTAATCTT
Oligo284	GGAGGGAAGGTACATACATTCAACCGATTCTCTTCACCGTAATCTT
Oligo285	ATTCAAAATTTAGAACATCATTACGCCGTCTCTTCACCGTAATCTT
Oligo286	AGTACCATTAAATCTTGTAAACGTTATATCTCTTCACCGTAATCTT
Oligo287	GCTTTAATAACATTGAACAACATTATACTCTCTTCACCGTAATCTT
Oligo288	GAGCCATCGGAATTCCAGGCGGATAAAATCTCTTCACCGTAATCTT
Oligo289	ATTTTTTCATCAATATCCCAATCCAAGGTCTCTTCACCGTAATCTT